MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

PAM0135 –ALGEBRA

(Foundation in Information Technology / Life Sciences)

11 MARCH 2017
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.

2. Answer **ALL FIVE** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

4. All necessary working steps **MUST** be shown.

Instruction: Answer ALL **FIVE** questions.

Question 1 [10 marks]

Solve the equations and inequality:

a. $4x^4 - 43x^2 + 63 = 0$ (4 marks)

b. $(x-6)^{\frac{2}{3}} = 2$ (2 marks)

c. $\frac{2x-3}{x+2} \leq 4$ (4 marks)

Question 2 [10 marks]

Given the functions $f(x) = \frac{3x+5}{2x-1}$ and $g(x) = \frac{2-3x}{5x+4}$.

a. Determine the domain of $f(x)$ and $g(x)$. (2 mark)

b. Find the function $f \circ g$, and its domain. (4 marks)

c. Find the function f^{-1}, and determine its domain and range. (4 marks)

Question 3 [10 marks]

a. Given the quadratic function $f(x) = 12x^2 + 49x + 15$.
Find the vertex, the x-intercepts, and the y-intercept of the graph of f.
Hence, sketch graph of $y = f(x)$. (6 marks)

b. Given the polynomial function $f(x) = 6x^3 - 11x^2 - 102x + 35$. Factorize $f(x)$ completely, given that $(x-5)$ is a factor of f. (4 marks)

Continued...

Question 4 [10 marks]

a. Sketch the graph of the function $f(x) = \ln(x-4)$. Show clearly 2 points on the graph and the vertical asymptote. State the domain and range of f.

(4 marks)

b. Solve the equations:

i. $10^{4x+1} = 3^{x-2}$ (3 marks)

ii. $4(4^x) - 37(2^x) + 40 = 0$ (3 marks)

Question 5 [10 marks]

a. In the expansion of $(x-5y)^{15}$, find

i. the first three terms of the expansion. (3 marks)

ii. the term containing $x^{18}y^7$. (2 marks)

b. Given that the tenth term and the twentieth term of an arithmetic sequence are $\frac{448}{5}$ and $\frac{418}{5}$ respectively. Find the first term and the common difference of the arithmetic sequence. Hence, find the sum of the first 30 terms of the sequence. (5 marks)

End of Paper

APPENDIX

$a^2 - b^2 = (a-b)(a+b)$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^2 = a^2 - 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$\log_b b = 1$

$\log_b 1 = 0$

$\log_b (MN) = \log_b M + \log_b N$

$\log_b \left(\frac{M}{N}\right) = \log_b M - \log_b N$

$\log_b M^p = p \log_b M$

$\log_b M = \frac{\log_a M}{\log_a b}$

$a_n = a_1 + (n-1)d$

$a_n = a_1 r^{n-1}$

$S_n = \frac{n}{2}(2a_1 + (n-1)d) = \frac{n}{2}(a_1 + a_n)$

$S_n = \frac{a_1(1-r^n)}{1-r}$

$S = \frac{a_1}{1-r}$, infinite sum $|r| < 1$